A 190 and 560 GHz Near Field Range for Beam Pattern Testing of the MIRO Comet Orbiting Radiometer

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The Microwave Instrument for the Rosetta Orbiter (MIRO) is a compact submillimeter wave radiometer for the ESA sponsored Rosetta comet orbiter. MIRO will measure continuum and spectral emission from the tail and surface of Comet Wertanen at 189 and 560 GHz as the comet travels from 3.25 to 1 AU.

MIRO's optics consist of a offset Cassegrain antenna with a 30 cm primary, a diplexer, matching mirrors, a corrugated feed horn at 190 GHz, and a Pickett-Potter feed horn at 560 GHz. The required beam pattern at 560 GHz is 8 arcmin (FWHM) with a pointing accuracy of 1 arcmin. The optics are mechanically aligned to 0.001 inches, however, some tuning is required to get the desired performance. Atmospheric absorption and the high gain of the antenna preclude a far field measurement. To measure beam patterns and tune the optics, we are using a Nearfield Systems Inc. 91 by 91 cm scanner originally built for the SWAS project. The limits of the sources at 560 GHz and the high multiplication factors required for the reference signal pose unique challenges. We will present our RF system and measured beam patterns.